undermines those thresholds or that even serves as a basis to question them.[39]

II. EchoStar's Suggestions That Would Permit Misoriented Antennas Are Without Merit

EchoStar also makes a number of other assertions, each of which would essentially permit the misorientation of antennas, that, while not expressly affecting the digital signal strength standards themselves, would have a negative effect on local network stations by penalizing them for inappropriate factors and, consequently, shrinking their local service areas. None of these assertions has any merit.

First, EchoStar claims that it is uncommon for households to use rotors. Indeed, EchoStar claims that only about 10-15% of households with outdoor antennas also utilize rotors.[40] EchoStar's estimate of rotor use, however, is fully consistent with the fact that, in most markets, the network affiliates are essentially co-located. Because they are essentially co-located, a rotor is not necessary. NAB showed that 83% (112 of 135) of the television markets with a complement of all four of the

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[39] Although it is not clear, EchoStar also appears to suggest that the actual signal strength *measured* during a site test be "adjusted" downward for a variety of reasons. *See* EchoStar Comments at 7-9; Hammett & Edison Statement at 5. If that is what EchoStar is saying, it must be summarily rejected. SHVERA expressly *fixes* the signal strength thresholds set forth "in section 73.622(e)(1) of title 47, Code of Federal Regulations, *as in effect on December 8, 2004*." 47 U.S.C. § 339(a)(2)(D)(vi)(I) (emphasis added).

EchoStar also repeatedly states that, for digital television, "the difference between an acceptable picture and an unacceptable picture is no picture at all." Hammett & Edison Statement at 11; *see also* EchoStar Comments at 2. This is not true. DTV receivers do not fail by exhibiting no picture at all. Instead, momentary dips in signal strength, momentary increases in interference, and momentary instances of multipath, if temporarily too great for the receiver to handle, result in momentary freezing or macro-blocking. This is no different than what a viewer sees with momentary satellite reception failure. *See also* ATI Comments, Attachment B, White Paper, at 2 & Figure 1.

[40] *See* Hammett & Edison Statement at 2.

Big 4 affiliates have essentially co-located transmitter sites.[41] NAB's data and EchoStar's estimate match up almost exactly.

Second, EchoStar claims that 70% of households are predicted to receive signals from stations that do not fall within the half-power beamwidth of the antenna assumed by the planning factors.[42] However, EchoStar did not analyze whether the stations making up this percentage were Big 4 network affiliates and whether they were affiliated with the same network or a different network. Moreover, in fringe areas the angle necessary to encompass all of the network stations broadcasting from the central metropolitan area is likely to be much smaller than 50°. Furthermore, it is not necessary, for purposes of SHVERA, that a household be able to receive every network affiliate from every market that it may be predicted to receive. For example, a household in Montgomery County, Maryland, located in the Washington, D.C., DMA, may also be predicted to receive the Baltimore stations, but, if it points its antenna towards the Washington stations, that is sufficient, and the angle between the Washington stations and the Baltimore stations is irrelevant. Finally, EchoStar's assertion that "most viewers will not be able to receive optimally all available DTV stations without a properly oriented rotatable antenna"[43] only shows that the Commission's assumption that households should and will use a rotor to orient the antenna properly is correct.[44]

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[41] *See* NAB Comments, Engineering Statement of Meintel, Sgrignoli, & Wallace, at ¶ 44.

[42] *See* Hammett & Edison Statement at 3.

[43] Hammett & Edison Statement at 3.

[44] *See Cable Communications Policy Act Rules*, Second Report and Order, FCC 88-128, 64 Rad. Reg. 2d (P & F) 1276 (1988), ¶ 18 (stating that the Commission has always expected and recognized that "persons living in areas located in the outer reaches of the service areas of broadcast stations (for example, at the edge of a predicted Grade B contour) can, and generally do, take relatively simple measures such as installation of an improved roof-top antenna and careful location and orientation of that antenna to enhance their off-the-air reception"); *Improvements to UHF*

(continued...)

The use of a rotor "solves" this purported problem *in toto*.

Third, and finally, EchoStar claims that, during a site measurement test, the test antenna should only be oriented "in the same direction as other antennas in the area, since it can be assumed that those antennas would be oriented toward a direction that provides the best reception overall."[45] EchoStar ignores several obvious problems with this suggestion: neighboring households may have rotors and only be temporarily oriented in their current direction, neighboring households may have antenna installations that have been essentially abandoned, there may be no neighboring households with outdoor antennas, and there is no readily available methodology to determine which direction the neighboring households have oriented their antennas and to translate that into a direction for the test antenna. In addition, the test antenna should be oriented to the strongest signal, which may mean it is oriented to a nearby multipath reflector and not to the bearing of the transmitter site. There is simply no reason to adopt EchoStar's proposal, which constitutes bad engineering practice.

In short, EchoStar's attempts to avoid the use of rotors or to not fully orient an antenna properly are inappropriate and contrary to the Commission's long-standing expectations.

Conclusion

For the foregoing reasons, Network Affiliates respectfully request that the Commission reject EchoStar's purported "adjustments" to the DTV planning factors and EchoStar's other suggestions that would thwart localism and shrink network affiliate service areas. Instead, as set forth in the

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[44](...continued)
Television Reception, Report and Order, 90 F.C.C.2d 1121 (1982), ¶ 50 (advising that "[a]ntennas should be installed by 'probing' for the best receiving location; signal strength can vary significantly over a very short distance; thus, the antenna should be installed at the location that provides good picture quality for the channels desired").

[45] Hammett & Edison Statement at 4-5.

opening comments, Network Affiliates respectfully request that the Commission recommend to Congress (1) that the digital signal strength thresholds set forth in Section 73.622(e)(1) remain the same for purposes of determining whether a household is "unserved" by a digital signal pursuant to 17 U.S.C. § 119(d)(10); (2) that the testing methodology set forth in Section 73.686(d) be modified slightly, as explained therein, so that the procedure may be used for digital signal site tests; and (3) that Congress prescribe a slightly modified ILLR model, as explained therein, to be used after the digital television transition is complete to presumptively determine the eligibility of a household to receive a duplicating distant digital network signal.

Respectfully submitted,

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July 5, 2005

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Technical Standards for Determining Eligibility	)	
For Satellite-Delivered Network Signals Pursuant	)	ET Docket No. 05-182
To the Satellite Home Viewer Extension and	)	
Reauthorization Act	)	
	)	

To: Office of the Secretary
Attn: The Commission

REPLY COMMENTS OF ATI TECHNOLOGIES, INC.

ATI Technologies, Inc. ("ATI"), by its attorneys, hereby submits these Reply Comments in response to the Commission's *Notice of Inquiry* on the above-captioned proceeding. As the industry leader in the design and production of DTV receiver chips, ATI submitted Comments explaining, among other things, how the performance of DTV receivers has improved dramatically in recent years, as demonstrated by both A/74 Field Ensemble vector testing and in the "real world" by manufacturers conducting their own field tests. ATI noted that, in the second half of 2004, the vast majority of ATI's customers adopted the advanced technology found in "Receiver D" – a fifth generation VSB demodulator – and that products containing this improved technology are only now beginning to be shipped to retailers. Furthermore, based on historical price reductions and anticipated manufacturing volumes, ATI projected in its Comments that the latest generation of high performance VSB demodulators will be available in 2006 for less than the current price for the lower performance VSB demodulators found in the DTV receiver market today.

After reviewing the Comments in this proceeding, ATI is compelled to file these brief Reply Comments responding to the Comments of EchoStar Satellite Corporation ("EchoStar"). EchoStar's Comments urge the Commission to alter its DTV signal strength standard and other rules to account for the alleged failure of the television manufacturing industry to produce a product capable of receiving terrestrial DTV signals as and when anticipated by the FCC's rules. The Commission should decline EchoStar's invitation to rewrite its rules.

EchoStar based its arguments solely on its consulting engineers' observations of the performance of DTV receivers. The observations do not appear to have conformed to the A/74 Recommended Practice nor to the procedures used by ATI and other chip manufacturers. Importantly, the EchoStar observations also do not appear to have been as robust and thorough as the extensive laboratory and field evaluations conducted by original equipment manufacturers who rely on their proprietary tests to design DTV receivers, select the components such as VSB demodulators to use in their devices, and assess the performance of their products and those of their competitors. The Commission should not base its report to Congress or revise its rules based on observations that are inconsistent with the standards and practices of the industry.

Furthermore, EchoStar conducted its observations of DTV receiver performance with equipment containing prior (and therefore inferior) generations of VSB demodulators. Because the OEMs only transitioned in mass to the current generation of chipsets in the second half of 2004, the DTV receivers available to the public (and thus EchoStar's engineers) as recently as May 2005 almost certainly did not include the latest technology. It is not surprising, then, that the DTV receivers observed by EchoStar suffered from the very shortcomings that the fifth generation of VSB demodulator was designed to resolve.

If the Commission elects to conduct its own field tests, it should evaluate DTV receivers containing fifth generation VSB demodulators. ATI projects that a majority of DTV sets and cable set-top boxes reaching the market as soon as this summer, and the overwhelming majority of such devices reaching the market in 2006, will include this latest technology. Any measurement of DTV receiver performance must be conducted with the specifications that very soon will be standard across virtually all manufacturers.

ATI recognizes that DTV receivers in homes today include prior generations of VSB demodulators. Consumers who paid thousands of dollars for DTV sets over the past few years, however, are much more likely to receive television programming via cable and DBS services than over-the-air reception. Cable and DBS providers currently are upgrading their set-top boxes to MPEG-4 and other new technologies, and these new set-top boxes overwhelmingly will include fifth generation VSB demodulators. Early adopters, therefore, will also begin benefiting from the improved performance of the fifth generation VSB demodulators as they replace their set-top boxes. In other words, the number of consumers relying solely on prior generations of VSB demodulators will decrease at the same time that consumers acquiring new DTV receivers overwhelmingly will obtain equipment containing fifth generation VSB demodulators. The current universe of consumers relying on prior generations of DTV receiver technology soon will begin shrinking, thereby making any new Commission rules based on the outdated technology increasingly irrelevant with each passing month.

Conclusion

The newest DTV receiver technology will permeate the entire marketplace rapidly over the next several months. As a result, it would be unreasonable at best for the Commission to craft any DTV receiver prediction model or measurement standard based upon EchoStar's observations of outdated and disappearing technology, even if such observations had been conducted consistent with industry practices.

Respectfully submitted,

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Dated: July 5, 2005

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Technical Standards for Determining	)	ET Docket No. 05-182
Eligibility for Satellite-Delivered Network	)	
Signals Pursuant to the Satellite Home	)	
Viewer Extension and Reauthorization Act	)	

Reply Comments of
Cohen, Dippell and Everist, P.C.

These Reply Comments are submitted on behalf of Cohen, Dippell and Everist, P.C. ("CDE") to the Notice of Inquiry in ET Docket No. 05-182. The Federal Communications Commission ("Commission"), in this proceeding, began the process to determine the availability of digital signal strength standard and testing procedures. This procedure would be used to determine the presence or absence of an appropriate DTV signal at a household that may be eligible to receive distant broadcast network signals from satellite communications providers. CDE has reviewed the various comments that were filed at the Commission.

The purpose of the docket is to have the Commission study whether any statutes and regulations should be revisited to respond to the provisions of Section 204(*b*) of the Satellite Home Viewers Extension and Reauthorization Act of 2004 ("SHVERA").

Background

As discussed in the Notice of Inquiry in 1988, Congress adopted the Satellite Home Viewer Act ("SHVA") as an amendment to the Copyright Act. Under SHVA, the Commission sought a

balance to protect broadcasters' programming interests while permitting households that were not regularly served by local stations to be provided broadcast programming via a satellite provider. Subsequently, in 1999 Congress revised the prior statute by adding Section 339(c)(3) to the Communications Act of 1934. It basically required the Commission to reconsider and develop a point-to-point predictive model. In late 2000, the Commission issued its Report to Congress recommending that the Grade B signal intensity standard and eight of the nine (9) planning factors be retained as a basis of household eligibility. In addition, in late 2000 the Commission indicated that it was premature to construct a similar methodology for eligibility for distant DTV signals.

Discussion

In the Notice of Inquiry, the Commission requested information on:

- receive antenna placement and whether fixed or rotatable
- whether Section 73.686(d) be amended to create a different procedure for DTV signal is present than for the present NTSC methodology.
- presence of certain signal strength using antennas of reasonable cost and installation
- whether to develop a predictive methodology to determine that a household is unserved
- whether there is a wide variation in the ability of consumer grade sets to display a high-quality picture
- whether to include factors such as building loss, external interference source or undesired signal from digital and analog stations, foliage and man-made clutter

The joint comments of ABC, CBS and NBC[1], comments of the Association of Maximum Service Television, Inc.[2] and comments of the National Association of Broadcasters[3] are noteworthy.

These comments are useful in responding to the Commission's request for information and are supported, particularly the joint network comments containing the statement of Jules Cohen, P.E. However, it is the opinion of this firm that it is premature to develop any criteria based on available data. The 1988 (SHVA) and 1999 (basis of SHVVA) amendments to the Copyright Act and the 1934 Communications Act were developed on a historical mountain of data accumulated over more than 30 years. To date, that same reservoir of data is not available in which to make this assessment for DTV. To this end, the Commission should make available its DTV measurement data collected in the Washington, D.C. area. This would help to ascertain the areas in which the focus of this Notice of Inquiry should take place. Further, it is to be recognized that the broadcast industry is in transition to implement DTV and therefore a period of buildout will continue. This is readily apparent from the dates imposed by Report and Order, MM Docket No. 03-15.[4] Therefore, a realistic and useable assessment of the DTV service to be studied cannot be made until the buildout and data collection are

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[1]Comments of the ABC, CBS, and NBC Television Affiliate Associations

[2]Comments of the Association for Maximum Service Television, Inc.

[3]Comments of the National Association of Broadcasters

[4]In the Matter of Negotiated Channel Election Arrangements, Second Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television, MM Docket No. 03-15, RM 9832, adopted June 3, 2005 and released June 8, 2005.

studied cannot be made until the buildout and data collection are completed. Many factors have hampered this buildout including environmental, terrorist, and international coordination issues.

Therefore, lacking the final disposition of the DTV facilities and the necessary data impose an uncertainty into the process and thereby this proceeding.

It is mission critical that any such task be based on reliable and sensible data. The data describing the station's technical parameters should reflect that actual station's DTV facilities. For example, the data requested in the DTV form to describe a directional pattern and the actual pattern printout can result in errors up to 10 dB. Further, the current database does not take accurately into account when a station specifies a combined electrical and mechanical tilt is used. Nor does the current database accurately take into account the actual elevation pattern. These factors also can lead to incorrect results in any predictive model. Therefore, such routine parameters in this process need to be revisited in order to yield a meaningful predictive method.

Respectfully Submitted,

Donald G. Everist
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Date: July 5, 2005

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
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Pursuant To the Satellite Home Viewer	)	
Extension and Reauthorization Act	)	
Reauthorization Act of 2004	)	

REPLY COMMENTS OF ECHOSTAR SATELLITE L.L.C.

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July 5, 2005

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Washington, DC 20554

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REPLY COMMENTS OF ECHOSTAR SATELLITE L.L.C.

EchoStar Satellite L.L.C. ("EchoStar") hereby submits its reply comments on the Notice of Inquiry released by the Commission on May 3, 2005 ("NOI"). The NOI sought comment on the adequacy of the digital signal strength standard and testing procedures used to determine whether households are eligible to receive distant digital television ("DTV") network signals from satellite carriers.[1]

EchoStar urges the Commission to reject the often counter-intuitive submissions of broadcaster interests that would reduce the accuracy of digital signal strength testing and/or future predictive models in determining whether a consumer can actually receive a good quality digital picture over-the-air at his or her location using readily available consumer equipment. Such rules would doom millions of subscribers to inadequate DTV reception and delay the DTV transition that Congress has done so much to foster. If the DTV transition nonetheless proceeds,

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[1] *Technical Standards for Determining Eligibility For Satellite-Delivered Network Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act*, FCC 05-94, Notice of Inquiry, ET Docket No. 05-182 (rel. May 3, 2005), published 70 Fed. Reg. 28503 (2005) ("NOI").

such proposals could mean that millions are left behind, without *any* high definition signal from one or more networks.

In addition, because the scope of the distant digital signal license is not the subject of this inquiry, the Commission should resist making premature pronouncements about the meaning of the statutory copyright license provisions, despite broadcasters' extensive submissions on this topic, and should focus instead on its statutory mandate to consider improvements to the digital signal strength standard and testing procedures. Finally, the Commission should dismiss, for being completely irrelevant to this proceeding, the gratuitous attacks made by broadcasters against the integrity of the Direct Broadcast Satellite ("DBS") industry.

I. THE COMMISSION SHOULD AVOID MAKING INTERPRETATIONS ABOUT THE SCOPE OF THE DISTANT DIGITAL LICENSE THAT ARE IRRELEVANT TO THIS PROCEEDING

As an initial matter, EchoStar notes that the National Association of Broadcasters ("NAB") and the ABC, CBS, and NBC Television Affiliate Associations ("Network Affiliates") devote many pages in their comments to setting out their interpretation of the general scope of the statutory license for distant digital signals, pointing to new limitations on the carriage of such signals introduced by the Satellite Home Viewer Extension and Reauthorization Act of 2004 ("SHVERA").[2] No doubt, the broadcasters would like the Commission to endorse its view of those provisions.

This inquiry, however, is not about the general scope of the distant digital signal license. Instead, this is "an inquiry regarding whether, for purposes of identifying if a household

[2] Comments of National Association of Broadcasters at 1-13, *filed in* MB Docket No. 05-182 (filed Jun. 17, 2005) ("NAB Comments"); Comments of the ABC, CBS, and NBC Television Affiliate Associations at 1-13, *filed in* MB Docket No. 05-182 (filed Jun. 17, 2005) ("Network Affiliates' Comments").

is unserved by an adequate digital signal under [17 U.S.C. § 119(d)(10)], the digital signal strength standard in [47 C.F.R. § 73.622(e)(1)], or the testing procedures in [47 C.F.R. § 73.686(d)], such statutes or regulations should be revised" to take into account various statutory factors affecting signal strength and reception.[3] To this end, the Commission is required to deliver a report to Congress with its recommendations for changes to the digital signal strength standard or testing procedures, including a recommendation on whether to use a predictive model to determine whether a household is "unserved."[4] This inquiry has nothing else to do with the digital signal license.

Accordingly, the broadcasters' extensive submissions in this regard are irrelevant and the Commission should resist making premature pronouncements about the meaning of the statutory license provisions beyond the scope of the inquiry mandated by Congress. Otherwise, the Commission risks making interpretive rulings in the abstract that parties may later claim were definitive and worthy of deference. Even more important, the Commission is not charged with enforcing the copyright laws. The courts, and not the Commission, are tasked with adjudicating disputes over the scope of 17 U.S.C. § 119.

II. THE COMMISSION SHOULD RECOMMEND CHANGES TO THE DIGITAL SIGNAL STRENGTH STANDARD, TESTING PROCEDURES AND FUTURE PREDICTIVE MODELS THAT WOULD IMPROVE, NOT WORSEN, THEIR ACCURACY IN DETERMINING WHETHER A HOUSEHOLD IS "UNSERVED"

Whether a household is unserved by a digital over-the-air signal should be measured against the consumer's ability to receive a good quality picture in the location in which he or she resides using readily available consumer equipment. The adequacy and accuracy of the

[3] *See* 47 U.S.C. §§ 339(c)(1)(A) and (B).

[4] *See* 47 U.S.C. §§ 339(c)(1)(B)(iv) and 339(c)(1)(C).

digital signal standards, the testing procedures, and future predictive models should be judged against this standard.

As EchoStar has pointed out, digital television ("DTV") reception problems can result not only in degraded picture quality but, more often than with analog reception, can also result in the consumer not being able to receive a picture at all.[5] Consequently, it is important to ensure that the digital signal strength standard, the testing procedures, and any predictive model used to determine whether a household is unserved, take into account all factors that affect whether an artifact-free DTV *picture* can actually be received, and not merely whether the DTV *signal* is strong enough at the location in question. Contrary to the broadcasters' suggestion, the fact that Congress chose to limit the availability of distant digital signals in SHVERA does not reduce the need for accuracy in the remaining situations in which it is important to determine when a household is unserved. Indeed, these are the households most at risk during the digital transition -- *i.e.* households in smaller, typically rural, markets that cannot get a local digital signal over-the-air and in which cable service and/or satellite local-into-local service may not be available.

In its comments, EchoStar's engineering experts, Hammett & Edison, Inc. (H&E), have shown why some of the assumptions in the Commission's DTV planning factors appear to have been unrealistic. In a supplemental report (Attachment A), H&E further responds to the accuracy of the assumptions in the DTV planning factors raised by broadcasters ("H&E Reply Statement"). In addition, EchoStar has proposed several changes to the digital strength standard, testing procedures and predictive methodology that would make them more accurate in determining when a household is digitally "unserved," including the use of indoor antennas, the

[5] Comments of EchoStar Satellite L.L.C. at 2, *filed in* MB Docket No. 05-182 (filed Jun. 17, 2005) ("EchoStar Comments").

lack of rotation in many consumer antennas, and the need to take into account time variability in signal strength. In contrast, many of the broadcasters' comments and suggestions would have the opposite effect or impose unreasonable burdens on consumers.

The Broadcasters Ask Consumers to Make Unreasonable Expenditures to Gain Access to an High-Definition Signal. What is squarely *within* the scope of this inquiry is the extraordinary burden that the consumer would have to bear in order to satisfy all the requirements suggested by the broadcasting industry in order to receive a clear over-the-air digital signal. The broadcasters would have consumers purchase an incredible litany of state-of-the-art equipment, each straining further the consumer's budget: the most up-to-date "generation" of DTV receiver in order to reduce (without eliminating) multipath interference problems; a low-noise amplifier ("LNA") to boost DTV reception; Type RG-6 coaxial cable to avoid downlead line loss; separate antennas for VHF and UHF to improve reception; and some external means of switching between the two antennas. The cumulative cost of these items to consumers will be significantly above the cost of an analog-to-digital converter box that the broadcasters are urging Congress to provide as a subsidy for analog viewers. Finally, this enumeration of costs for additional items does not include any fees associated with installing these devices in consumers' homes.

The Commission's Planning Factors Were Intended Primarily For Channel Allotments. It is important to note that the DTV planning factors were developed primarily for a purpose different from that here. As H&E explains, these factors were adopted in part to assign channel allotments, and not for the more granular purpose of concretely ascertaining whether a particular consumer could actually receive a DTV picture at his or her home. Even more important, many of these factors have been overtaken by events.

For example, as H&E points out, the planning factors assume different receiving antenna patterns for analog and DTV reception.[6] The belief underlying that assumption was that consumers would install better-performing antennas for DTV use. In fact, however, events on the ground suggest a more reasonable assumption is that they will not. H&E notes that the specified 28 dBu minimum field strength required for DTV reception at VHF low-band has also been criticized as being inadequate,[7] largely due to inadequate consideration of man-made noise at those channels. Additionally, the planning factors assume that interference from DTV stations operating on other than co- and adjacent-channels would not exist. This assumption was in turn based upon the performance of a dual-conversion prototype DTV receiver. Again, subsequent developments have cast doubt on that assumption. Most of all, consumer DTV receivers today are single-conversion, meaning that they are far more susceptible to interference from so-called "taboo channels."[8]

Now that several generations of consumer DTV receivers are available, it is appropriate for the Commission to draw upon actual experience with this equipment to employ more empirically tested planning factors in this proceeding, since such factors will more accurately reflect the consumer's ability to actually receive a DTV picture.[9]

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[6] See H&E Reply Statement at 5 (citing H&E Petition for Reconsideration in MM Docket No. 87-268, filed June 13, 1997).

[7] *See id.* at 6 (citing Victor Tawil and Charles Einolf, Jr., "Impact of Impulse Noise on DTV Reception at Low VHF," Proc. IEEE Broadcast Technology Symposium, 2004).

[8] *Id.*

[9] In its Comments, EchoStar highlighted the results of an H&E study revealing that the signal sensitivities of the current generation of DTV receivers can be significantly worse than the signal sensitivities assumed in the Commission's planning factors. *See* EchoStar Comments at 4. H&E concluded that the digital strength standard should be revised upward to take into account the reality of DTV receiver sensitivity.

Use of Outdoor Antennas for Testing Would Lead to Many Inaccurate Determinations of When a Household is "Unserved." The NAB essentially concedes that "[i]ndoor antennas perform much less well at receiving over-the-air TV signals"[10] because they have lower gain, are typically located at lower heights than outdoor antennas, are nondirectional, and are prone to dynamic multipath problems that affect reception.[11] Counter-intuitively, however, the NAB's proposed solution is to continue digital signal strength testing using properly pointed roof-top antennas.[12] This would virtually guarantee an inaccurate determination of whether a household is unserved for the many (*e.g.* apartment dwellers) that cannot practically install directional rooftop antennas.

The fact that the Commission's DTV planning factors assume the use of rooftop antennas, raised by NAB as a justification for its position, is beside the point. The pertinent question here is not broadcasters' service area requirements. It is a simple and concrete inquiry: whether the consumer in question can actually receive a good quality digital picture over-the-air. Accordingly, the Commission should utilize actual, empirically-based planning factors in this proceeding, including use of indoor antennas. Equally unavailing is NAB's assertion that the viewers in question will also be utilizing a satellite dish, which is typically installed outdoors.[13] The fact that such residents will also need a properly pointed satellite dish does not justify use of outdoor antennas for testing. DBS antennas are typically smaller and need only be pointed in one direction, whereas outdoor DTV antennas typically require substantially more space and

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[10] NAB Comments at 16-17.

[11] *Id.* at 17.

[12] *Id.* at 16; *see also* Network Affiliates Comments at 34.

[13] *See* NAB Comments at 18.

may need to be rotated to adequately capture different over-the-air stations. As a result, a DBS antenna is practicable in many settings where a rooftop DTV antenna is not.

The Use of Directional Gain Antennas for Testing Has Already Been Correctly Rejected by the Commission. The Network Affiliates suggest that tests be conducted using a directional gain antenna as opposed to a half-wave dipole antenna.[14] This, they say, would "ameliorate any difficulties that could be caused by multipath at the site."[15] This suggestion is misguided, would likely lead to inaccurate results in determining whether a household is "unserved," and has for these reasons already been rejected by the Commission in the analog context. Directional gain antennas are not representative of most indoor antennas.

Moreover, directional gain antennas are more difficult to calibrate and are more easily damaged (leading to an uncalibrated condition). They are also more expensive. These shortcomings have already led the Commission to reject use of directional gain antennas for signal measurement under the Satellite Home Viewer Act:

> Regarding the preparation for measurements, we considered the kind of testing antenna that should be used and conclude that a tuned half-wave dipole is the best choice. It is widely available, inexpensive, and simple to use. In situations where definite readings are required, it has advantages over gain antennas that are difficult to characterize (calibrate) over a wide range of frequencies. Although dipole antennas are susceptible to interference from signals other than the one being measured, the cluster measurements that we require will mitigate those effects.[16]

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[14] Network Affiliates Comments at 38.

[15] *Id.*

[16] *See Satellite Delivery of Network Signals to Unserved Households for Purposes of the Satellite Home Viewer Act; Part 73 Definition and Measurement of Signals of Grade B Intensity*, 14 FCC Rcd 2654, at ¶ 51 (1999) (citations omitted).

"Fifth-Generation" And Later Receivers Are Not a Panacea for Dealing With Multipath Interference. The Network Affiliates' candid admission that there may be multipath problems sits uneasily with their position that "multipath should not be taken into account in determining whether a household is served by an adequate digital signal."[17] To arrive at this cavalier disregard of the problem, the Network Affiliates note that "fifth generation" or the "latest" receivers can deal with more types of multipath. The Commission should resist adopting that position. While the latest receiver designs do appear to have improved abilities to receive digital signals in the presence of certain types of multipath over prior generations, they do not represent a panacea. As H&E explains, the white noise enhancement penalty associated with the operation of the equalizer in the DTV receiver still remains and must be considered.[18] The presence of multipath at a receiving site effectively reduces the available strength of the DTV signal at that site because the equalizer in the receiver generates noise in proportion to the degree of multipath.[19] For example, if there is 3 dB of white noise enhancement, then a receiver that had a 15.2 dB noise threshold under ideal conditions (*i.e.*, no multipath) will have a 18.2 dB noise threshold under the multipath condition. This 3 dB increase in noise is equivalent to a halving of the transmitter power of the DTV station. The NAB presents data[20] showing that fifth generation receiver performance under some static multipath conditions requires 3–4 dB of additional signal to overcome the white noise penalty. Since white noise enhancement can be substantial at sites having severe multipath, it is important that this parameter be measured and subtracted from the nominal measured field strength in any field test.

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[17] Network Affiliates Comments at 37.

[18] H&E Reply Statement at 4.

[19] *Id.*

[20] NAB Comments at 41, Table 12.

Equally importantly, H&E explains that fifth generation designs generally have failed to address difficulties associated with producing a usable DTV picture under dynamic (as opposed to static) multipath conditions, which may account for the continuing failure to receive about 10% of signals under empirical conditions.[21] And H&E notes that improvements in the performance of the fifth-generation demodulators do nothing to improve the performance of other components in the DTV receiver. Specifically, the performance of the tuners in consumer DTV receivers has been criticized as limiting DTV reception in the presence of otherwise adequate signal levels.[22] While these DTV tuner problems are largely associated with the presence of strong interfering signals, there may be impacts at many locations on consumer reception of network signals, which will not be resolved by use of fifth generation receivers.

Finally, the Commission should keep in mind that consumers generally have no knowledge of what "generation" DTV receiver they are purchasing. The "generational" concept is one employed by consumer electronics manufacturers, and is not something publicized to consumers at large. Indeed, even engineering experts at times have difficulty ascertaining what "generation" a receiver might be, and manufacturers are not necessarily willing to supply such information.[23] Thus, consumers may be expected to seek the product having the lowest cost. They may often do so even if provided with detailed information concerning the performance characteristics of that product. For all of these reasons, the Commission should not rely upon the roll-out of fifth generation and later receivers as a substitute for coming to grips with known difficulties such as multipath.

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[21] H&E Reply Statement at 5 (citing Tim Laud, *et al.*, "Performance of 5th Generation 8-VSB Receivers," IEEE Trans. Consumer Electronics, Vol. 50, No. 4, November 2004).

[22] *Id.* (citing Charles W. Rhodes, "Interference Between Television Signals Due to Intermodulation in Receiver Front-ends," Proc. IEEE Broadcast Technology Symposium, 2004).

[23] *See id.*

The Commission Should Take Into Account the DTV Signal's Time Variability. As EchoStar explained in its Comments in this proceeding, the Commission should bear in mind that field measurements are no more than a "snapshot" of typical reception conditions and thus, are inadequate to ensure long-term reliability of DTV reception.[24] While DTV service is to have at least 90% reliability over time, a single a single set of cluster measurements cannot adequately characterize the time variability to provide reasonable assurance that the DTV signal will be available 90% of the time. Therefore, some additional action, such as applying a correction factor, must be done. This issue appears to have garnered little, if any, comment from other participants in this proceeding.

Given that the FCC's criterion for DTV coverage is a specified threshold field strength with 50% confidence, 90% of the time, that is, a situational variability factor of 50% and a time variability factor of 90%, commonly written as F(50,90), a 90% time (or greater) reliability factor should be applied to the assumed median value obtained during the cluster measurements to adjust the assumed "typical" measured field strength to a 90% time value.[25]

The Commission Should Not Assume That All Consumers Have Low-Noise Amplifiers. The broadcasters also suggest that it is reasonable to assume that consumers use low-noise amplifiers ("LNAs") mounted near their rooftop antennas to boost DTV reception.[26] This is a wholly unrealistic assumption for a number of reasons. First, most LNAs, however, are not suitable for use with indoor antennas.[27] Moreover, encouraging broader use of LNAs can

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[24] *See* EchoStar Comments at 8-9.

[25] *See* H&E Reply Statement at 6.

[26] NAB Comments at 22-23; Network Affiliates' Comments at 23-27.

[27] Low-noise amplifiers installed indoors are often ineffective because of the high radio frequency noise levels encountered in such environments. *See* http://www.tvantenna.com/support/tutorials/uhf.html (Presented by The National Association of